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The difficulty found by Professor Emerson and myself in *precisely repeating* most of these experiments has doubtless been experienced by others working with the X-rays. When the conditions of an exposure seem identical with those of a previous one, the results often differ, from varying excitation of the tube, or possibly slight shifting of the source of the rays, or from numerous other causes difficult to control. A confirmation of results by other observers is therefore valuable.\*

Since the last paragraph was in type I have succeeded in proving that the 'fringe' is due to the spring by the somewhat surreptitious method of placing a second Crookes tube behind the plate, and thus projecting a shadow of the spring itself upon the plate on which at the same time the spring was reflecting the fringe. Fig. 2, is from a plate obtained a fortnight

ago. A silver dollar lay on the slide above the plate, directly over the spring which was behind the plate; the tube was 14 mm. above the plate and the exposure was one hour. The X-rays must have passed through the silver dollar and then have been reflected by the spring, giving the 'fringe.' Since the central bright line is much brighter than the other portions of the plate partially screened by the dollar, it would seem that this additional brightness can only result from the superposition of waves in the same phase, or, in other words, from something closely akin to interference. Similar fringes have been obtained through tinfoil instead of silver, and also where no obstacle intervened between tube and film. We hope by this method to obtain the wave-length of the X-rays.

EDWIN B. FROST.

HANOVER, N. H., March 10, 1896.

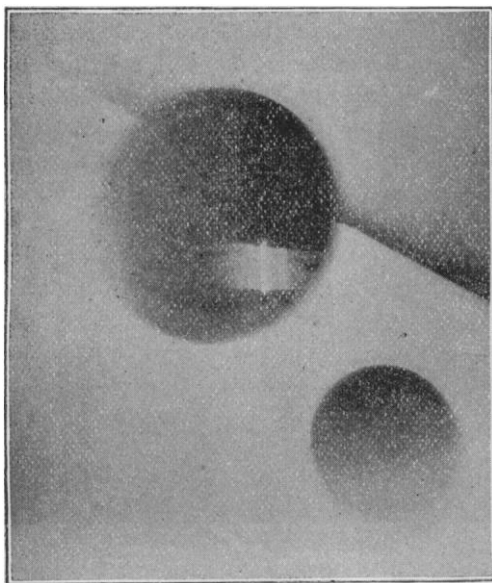


FIG. 2. SHOWING REFLECTION AND INTERFERENCE OF X-RAYS.

\* In a previous communication (p. 235), a slip of the pen made me invert the order of permeability of hard rubber, glass and brass; the rubber is of course the most permeable.

#### THE RECEPTION OF FOREIGN STUDENTS IN FRENCH UNIVERSITIES AND SCHOOLS.

In order to carry out effectively the plan for the reception of foreign students in the schools of France, in which there is now so much interest, the French government has formed a Committee of Patronage for the purpose of receiving new comers, giving them encouragement, and furnishing them with all necessary information in regards to their studies and facilities for life in the university towns. The object of these Committees is to make the student's stay in France agreeable as well as profitable. They also offer their friendly offices to the families of students.

#### THE PARIS COMMITTEE.

The Paris Committee has its headquarters at the Sorbonne, and is composed of the following members:

MM. Emile Boutmy, Member of the Institute; Director of the *École libre des sciences politiques* Michel Bréal, Member of the Institute. Xavier

Charmes, Member of the Institute. Darboux, Dean of the Faculty of Science. Gréard, Member of the French Academy; Rector of the *Académie de Paris*. Himly, Dean of the Faculty of Letters. Lamy, formerly Deputy. Lavisé, Member of the French Academy. Liard, Director of Higher Education. Paul Melon, General Secretary. Georges Picot, Member of the Institute. Albert Sorel, Member of the Institute. Vicomte Melchior de Vègue, Member of the French Academy.

A secretary is stationed in the office of the Committee, who will be for two hours each day at the service of persons desiring to obtain detailed information concerning life in Paris or the character of the instruction given in the different educational establishments.

There is an executive committee charged with the duty of maintaining regular connections with the different groups of foreign students in Paris.

The Paris Committee expects to be able to give scholarships of 200 to 350 francs to students especially recommended; these scholarships to be exclusively employed in payment of University fees.

#### THE COMMITTEE OF AIX.

This Committee, under the patronage of the Rector of the *Académie*, the Mayor of Aix, the Dean of the Faculty of Law and the Dean of the Faculty of Letters, is composed of Prof. Bouvier-Bangillon, of the Faculty of Law; M. Moreau, Adjunct Professor in the same Faculty; Prof. Ducros, of the Faculty of Letters, and M. Carbonel, Secretary of the Faculty of Law.

The Committee has arranged with transportation companies for reduction of fares for the benefit of students, and will neglect nothing which has to do with their moral and material interests.

Special courses of instruction in the French language, for the benefit of foreigners, have for many years been organized in connection with the Faculties of Aix.

#### THE BORDEAUX COMMITTEE.

This Committee is composed of Prof.

Bouchard, of the Faculty of Medicine; Prof. Gayen, of the Faculty of Sciences; Prof. Denis, of the Faculty of Letters, and Prof. Duguit, of the Faculty of Law, acting as Secretary.

#### THE LYONS COMMITTEE.

This Committee is composed of professors from the four Faculties: Prof. Lepine, of the Faculty of Medicine; Prof. Offret, of the Faculty of Sciences; Prof. Bourgeois, of the Faculty of Letters, and Prof. Berthelemy, of the Faculty of Law. There is, besides, a special committee composed of friends of the University, presided over by M. Cambfort, which will give special attention to questions connected with the interests of foreign students. The Secretary of this Committee is M. Thallers, of the Faculty of Law.

#### THE MONTPELLIER COMMITTEE.

This Committee has as its Secretary Prof. Flahaut, of the Faculty of Sciences, and, among other members, Prof. Bonnett, of the Faculty of Letters; Prof. Gidde, of the Faculty of Law; Prof. Gachon, of the Chair of History in the Faculty of Letters; M. Tempie and others. It has established certain courses free to foreigners, an elementary course and an advanced one. It will provide students with information concerning living facilities suited to their means, and will see that they are furnished with medical attendance.

#### THE NANCY COMMITTEE.

This Committee is composed of the four deans of the faculties of the University: MM. Bichat, Heydeditreigh, Krantz, Lederlenen, M. Schlagdenhauffen, director of the School of Pharmacy; M. Gavet, associate professor of the Faculty of Law; Prof. Molk, of the Faculty of Sciences; Prof. Bernheim, of the Faculty of Medicine; Prof. Grucker, of the Faculty of Letters, and Prof. Bleicher, of the *École supérieure de pharmacie*.

M. Bichat, Dean of the Faculty of Sciences, and M. Gavet, will devote themselves especially to the interests of foreign students at Nancy.

The Committee has formed in connection with the Students' Association, a special section for colonial and foreign students, the Vice-Presidents of which will be elected by the foreign students.

#### THE TOULOUSE COMMITTEE.

The President of this Committee is Dr. Maurel, and among its members are public officials of Toulouse, the deans of faculties, the directors of the schools of veterinary science, fine arts and music, and a certain number of persons who are considered by the consular officers resident at Toulouse especially likely to command the confidence of the families of foreign students.

The Committee will correspond with organization abroad or with families who contemplate sending to Toulouse students for a sojourn of some length. It will do all in its power to secure for foreign students engaged in regular courses of study the pecuniary opportunities which are enjoyed by French students. It has arranged with the Students' Association to extend to foreigners all the advantages which belong to its own members, and their admission to such official or private receptions as may occur.

The Committee offers to foreign students the following advantages: The opportunity to draw money in Toulouse without commission or discount; gratuitous medical service; hospital accommodations at half price; free admission to the meetings of the Geographical Society; free admission to the reading room; reduction of rates at hotels selected during the first eight days after arrival, and reception at the railway station, if desired.

#### THE FRANCO-AMERICAN SYNDICATE.

In connection with this movement there has also been organized by a number of

learned and representative men of France, a body called the 'Franco-American Syndicate,' the object of which is 'to promote and develop intellectual, social and moral relations between France and the United States.'

The intention of this Syndicate is to bring American students into direct relations with representative men of France, especially those who are representatives in their several professions.

The gentlemen who have volunteered to assist, not being directly engaged in official duties, have time at their disposal to devote to this work. The Honorary Chairman of the Syndicate is the Comte Carré de Busserolles, Brigadier General, retired, and Commander of the Legion of Honor; its President is Comte Henri du Bourg, and its Vice-President, Mons. P. de Rousiers, the author of a well-known work upon American life; and among its members are the Comte Perouse de Monclos and Mons. G. Balleyguier, architects; Mons. S. Thore, engineer; Mons. O. Coignard, Forestry Inspector; Dr. Chaillou, of the Pasteur Institute, and Mr. J. C. Van Eyck, of New York city, Member of the Royal Institute of the Netherlands. A number of eminent men, several of them members of the Institute of France, who on account of their official positions are unable to take active part in the work of the Syndicate, have promised their support and coöperation, as have also several army and navy officers of high rank.

It is the hope of this organization to have a house in Paris where there may be frequent gatherings of American students for social intercourse with these gentlemen and to listen to lectures, and that here also may be arranged plans for the advantageous utilization of the university holidays for purposes of professional study under the direction of competent Frenchmen.

The representative of the Syndicate in

Paris is Mons. G. Balleyguier, architect, 238, Boulevard St. Germain; and the representative of the organization in the United States is Dr. J. C. Van Eyck, Century Club, New York.

#### GENERAL INFORMATION FOR STUDENTS.

The following information is given concerning the admission of foreign students into the faculties and schools of France:

Instruction is absolutely gratuitous in the universities and faculties of France. They are open without reserve to strangers as well as to native students, and the grades established are the same for each. It is required, however, that both foreign and native students should give evidence of certain preliminary study. In the case of the French student this consists in the presentation of a bachelor's diploma certifying that courses of secondary instruction of a given nature have been completed. Strangers who have obtained from institutions in their own country certificates of instruction are admitted after a ruling shall have been made by the Minister based upon the advice of the proper section of the Advisory Committee on Public Instruction, whose duty it is to ascertain the actual value of the certificate offered. This is rendered necessary by the fact that the certificates of study in France and in foreign countries are not always equivalent in value.\*

The requirements in connection with obtaining degrees in the courses of higher instructions are the following: Matriculation, access to the library, privileges of practical work (only in the faculties of medicine and the schools of pharmacy), examination, certificate of proficiency, and diploma. The

\* Graduates of foreign universities who desire to enter the courses of the faculties should address an application to the Minister of Public Instruction, accompanied by (1) the original diplomas, with a request that their equivalence in France be determined, and that they be approved; (2) a certificate of birth (original and translation).

fees for matriculation are 30 francs quarterly, or 120 francs per year. Library privileges cost 10 francs per year. The fees for examination and diploma vary from 40 to 100 francs per year, according to the faculties.

These provisions relate only to students who are candidates for degrees. Those who wish simply to receive the instruction given by a faculty, without asking a certificate or diploma, will be permitted the greatest freedom of action.

Foreigners who give evidence of sufficient previous instruction will be admitted into most of the special schools either as pupils or as free auditors.

In a subsequent article, information will be given in regard to the facilities offered by the principal universities and special schools.

G. BROWN GOODE,

*Secretary of the American Branch of the Comité Franco-Américain.*

#### THE ESSENCE OF NUMBER.

NUMBER is primarily a quality of an artificial individual. By artificial is meant 'of human make.' The characteristic of these artificial individuals is that each, though made an individual, is conceived as consisting of other individuals. In language the designations for artificial individuals so characterized usually contain other connotation. Examples are a flock, a herd, a bevy, a covey, a throw, a flight, a swarm, a school, a pack, a bunch, a cluster, a drove, a company, a brood, a group, etc. To any such artificial individual pertains an important quality, its 'Anzahl,' which may agree or differ among such artificial individuals, as may their color. But something like color is made and recognized by insects and animals, so that color is not so highly artificial as number, but will serve for an illustration. Just as the color of a bunch of grapes might be identified by use of a